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SUBJECT: Kenya's Energy Future

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1. Summary: Kenya is facing a significant power shortage and is being forced to turn to more expensive sources of energy. Future production will come from increased electricity generation from geothermal sources and likely new coal-fired plants. A World Bank-promoted East African regional electricity grid could also help Kenya meet its growing demand, but is not an inexpensive solution. Recent geological study of Kenya's oil-producing potential is inconclusive. The privatization of the two dominant parastatals, KenGen, the state-run energy producer, and Kenya Power and Light Company (KPLC), the electricity distributor would be a near-term boost for Kenya's energy sector and business climate. Creating incentives for Independent Power Producers, especially in rural areas, should also be a priority. End Summary.

Kenya's Potential Energy Crisis

2. Kenya is facing a potentially significant power shortage and is being forced to turn to more expensive sources of energy. Power outages (approximately 11,000 per month throughout the formal system), extreme voltage fluctuations, and inconsistent quality of electricity are already significant problems for business and residential consumers. According to Energy Permanent Secretary Patrick Nyoike, widespread rationing of electricity could begin as early as September 2006 if KenGen and Kenya Power and Light Company (KPLC), Kenya's state-run energy producer and distributor, do not address the problem with greater effectiveness.

3. The current peak demand for power in Kenya is approximately 900 megawatts (mw), and is increasing by approximately twelve percent annually. Overall electricity consumption is growing at seven percent per year. At this time, the Kenyan power sector has an effective capacity to provide 1,030 mw, barely enough to cover the demand. David Mwangi, Chief Manager of Planning Research and Performance Monitoring of KPLC, acknowledges that a 100 mw safety margin is far too low -- the goal is to have at least 650 mw above the peak demand in reserve capacity. Kenya's biggest source of electricity (providing 75% of output) is from hydroelectric installations, which have limited reservoir capacity and depend greatly on inconsistent rains.

4. Compounding Kenya's energy difficulties, the distribution and transmission systems are inefficient, or, in many areas, non-existent. Distribution and transmission systems are poorly designed and in need of repair. An estimated 19% of net power generation is lost due to the inefficiency of the power system and poor management (a marginal improvement 2004's 20% loss). Each percentage point of power loss translates to about \$US2.5 million in lost annual revenue for KPLC, who's (modest) goal is to improve efficiency by one percent each year until only 15% is lost, saving \$10 million a year and increasing available capacity. [Note: By comparison, the U.S. loses less than 10% in its electrical distribution. End note.] KPLC is also hopes to decrease illegally-tapped power lines, which cost the firm over a million dollars a year in lost revenue, and exacerbates the on-going problems of frequent power shedding and blackouts, according to KPLC's Mwangi.

5. Currently, only 15% of the population has direct access to electricity. The government has promised to provide electrical service to 150,000 new Kenyan households a year for the next few years, increasing annual demand by 150 mw per year, according to Mwangi. Most businesses, especially manufacturing companies, are also demanding more electricity and improved service. Kenya's near-term electricity demand is likely to increase to at least 1,700 mw.

Where Will New Capacity Come From?

6. Kenya's electrical production comes from about 15, fairly small power plants -- including its hydro network. Kenya's biggest dam produces a maximum output of 250 mw,

compared to the world's biggest hydroelectric dams, which produce in excess of 11,000 mw. Another hydro plant on the Sondu-Miriu river system is under construction, with an anticipated 60 mw coming on-line in 2006. Most hydro potential and other "low-cost" options are already developed, so Kenya must now pursue alternative and potentially more expensive means of generating electricity.

17. Future production will likely come from new coal-fired plants. Coal is found in small quantities in Kenya, and the GOK intends to explore for additional sources. KenGen and KPLC believe that imported coal prices will remain lower and less volatile than oil, and so are committed to exploring the possibility of new coal plants, whether or not significant quantities are mined in Kenya. KenGen is searching for sponsors to pay for a feasibility study on establishing new coal-fired plants. [Note: The World Bank discouraged USTDA from financing a similar study, and has actively promoted geothermal power and a regional grid as the best solution to Kenya's energy needs. End note.] Environmental groups have already raised concerns about the likely unwillingness of the GOK to invest in modern pollution-reduction technology for any new coal plant.

18. At the same time, KenGen is in the process of purchasing an old gas turbine plant from Independent Power Producer (IPP) Westmont that will produce 44 mw when it comes on-line and is considering additional oil-based thermal plants. Existing oil-based thermal plants have been able to increase capacity during times of drought and most likely, oil plants will contribute to Kenya's power in the future. Kenya also purchases electricity from the Ugandan hydro system -- about 3% of Kenya's electrical capacity in 2004 -- and hopes to count on this source for years to come.

----- Can Geothermal Grow to Meet the Demand? -----

19. Geothermal plants currently are Kenya's second largest source of electricity, producing 127 mw (115 mw from KenGen-managed sources and 12 mw from IPPs). Kenya was the first African country to generate power using geothermic activity, and is still the only African country producing significant amounts. As reported in Reftel, geothermal has significant future potential. The Olkaria project adjacent to Hell's Gate National Park, in the Lake Naivasha region, hosts Kenya's two geothermal plants. A third phase of the existing geothermal field is almost on-line. Donors, including Germany and Japan, as well as the World Bank, have focused most of their energy-sector assistance on Kenya's geothermal potential, which is estimated at 2,000 mw within Kenya's Rift Valley. New geothermic exploration is occurring at six new sites at present, including near Lake Borgoria, an area outside of Olkaria.

110. However, KenGen and KPLC officials are guarded in their assessment, noting that Geothermal power can be 'damned expensive' to develop to quote Mr. Wahogo, the Chief Manager of Planning of KenGen. Identifying geological structures with easily accessible heat reservoirs is an imprecise science. At a cost of approximately six million dollars to drill a test well, the initial financial risk is significant. Furthermore, individual wells tend to produce only 20 to 30mw worth of steam each, not a significant amount unless a number of wells can be economically linked together through above-ground piping.

111. The current Olkaria development plan calls for future initial investments to be done through partnerships with IPPs, but to date there has been a noticeable lack of interest by private firms. For the Olkaria III project, only three companies bid, one of them was not serious and another was under-qualified. The remaining company, American-owned Ormat, has outlined a development plan that is more expensive than initial estimates. KenGen's Wahogo is not optimistic about the prospects of attracting significant foreign investment for small-output geothermal power plants in Kenya.

----- Is There a Regional Solution? -----

112. The World Bank has taken the lead on exploring the possible creation of an East African regional electricity grid. Such an improved grid could also facilitate power imports from South Africa and Zambia, which are already connected to Tanzania's grid. The energy-related Permanent Secretaries from the East African Community (EAC) have

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endorsed the plan, and it may be on the decision agenda for the next EAC summit. However, KPLC is not sold on the idea of significant new investments into a regional grid, which it views as not cost-effective due to energy losses from

distribution over such great distances. KPLC estimates that electricity coming into Kenya from beyond Tanzania would cost at least one-third more than domestically produced electricity.

----- Rural Electrification Going Slowly -----

13. The GOK has an official policy goal of providing electricity for the rural population, but the results have been minimal. According to KPLC officials, the parastatal has spent over \$US 100 million on rural electrification projects over the past 22 years, but to date can only offer power to less than 4% of the rural population. Increasingly, small rural communities, farming co-ops, individual families, self-help groups, and isolated schools and health clinics are pursuing various combinations of solar, wind, and micro hydro systems to meet their own needs, often with the financial and technical assistance of NGOs or international donors. The GOK has encouraged this trend by permitting energy production of less than 2 mw (approximately enough to power 1,000 consumers) without a license. Unfortunately, there is no systemic program to promote small-scale energy production and the GOK offers no tax incentives for small scale power producers. While such localized production can be useful to those who can afford it, even the most efficient alternate energy system has start-up costs that make electricity at least twice as expensive as in Kenya's major urban areas. MPs from areas underserved by KPLC are considering legislative action breaking KPLC's distribution monopoly and permitting IPPs to compete in power distribution.

----- Will Kenya Strike Oil? -----

14. In recent years, significant geological study has gone into determining Kenya's potential as an oil producer. There have been recent oil discoveries in Southern Sudan within 100 km of the Kenyan border, and although the geography is the same, no commercial oil deposits have yet been discovered in Kenya. The state-run National Oil Corporation of Kenya decided to explore Kenya's coastal waters for oil and invited the Australian firm Woodside, to carry out the search. Though some news reports state Woodside's investigations to "be encouraging," so far, Woodside's CEO Don Voelte tells a different story. As reported in Alexander's Gas and Oil website, Voelte noted that "the venture in Kenya has just a 3% chance of success; what we're trying to do is have a few home runs, a few huge hitters out there." The company is planning to drill exploratory deep wells (up to 3000 meters) off the Kenyan coast in mid 2006. "If it hits, it will be huge," Voelte reportedly said. "Don't go buy our stock for Kenya, but if you own our stock and Kenya hits, you'll be very happy." If a commercially-viable source is discovered, production efforts would take at least four years before any Kenyan oil would reach the local or international market.

----- Privatization and the Role of IPPs -----

15. Increased privatization is also expected to help Kenya's energy sector. The World Bank, other donors, and industry analysts have all promoted the privatization of KenGen and KPLC, both of which are viewed as inefficient, over-staffed, and significant hurdles to an effective energy policy. In 2000, the World Bank threatened to withhold three-quarters of a 75 million dollar loan to Kenya unless the GOK enhanced private participation in the energy sector. The GOK subsequently announced plans for the partial privatization (30 percent) of KenGen, which the government claims would have an estimated value of Ksh 10 billion (about \$US132 million). A number of energy analysts have disputed that estimate as over-optimistic unless the deal includes management control, something the GOK is currently unwilling to offer. As noted above, the GOK is also counting new IPP investments. Since a 1997 regulation allowing IPPs to be licensed for power purchasing agreements with KPLC, three IPPs have been producing commercial quantities of power (about 145 mw in total).

----- Donors Are Active in the Sector -----

16. Kenya's energy sector has long been a focus of donor activity. Japan's Overseas Economic Cooperation Fund provided Kenya with a \$US63 million loan for the Sondu/Miriu dam. The East African Development Bank has recently funded a \$US7 million power line project for KPLC. Under an on-going \$US405 million energy sector recovery program funded by World Bank, the Nordic Development Fund, and the French Development Agency, France recently loaned Kenya \$US34 million for improved electricity transmission. UNDP and the World Bank have funded much of Kenya's geothermic exploration and development in the past few

decades. The World Bank has also loaned over \$US100 million for the Olkaria projects. The Federal Republic of Germany, through Kreditanstalt fr Wiederaufbau (KfW) will make an additional \$US17 million available to the GOK to lay the groundwork for developing another geothermal power plant in Kenya. The new credit is in addition to KfW's \$US14 million loan for Olkaria II, and \$US9 million for Olkaria IV.

Comment

17. Unreliable electricity is now one of the most significant drags on Kenya's business and investment climate. The GOK is counting on the successful "fast-tracking" of both the Olkaria III geothermal plant and the Sondu-Miriu hydropower dam to inject another 95mw into the system, but that is only a partial solution. It will take a combination of more oil, gas and, likely, coal plants, as well as new geothermal development, and a regional power grid to come close to meeting Kenya's growing power demand in the next few years.

18. As noted in the recent Foreign Commercial Service assessment (http://www.buyusainfo.net/docs/x_80968.pdf), there may be opportunities for American companies in what, hopefully, will be Kenya's more open, private sector-driven energy future. Privatizing KenGen and KPLC should be high on the GOK's priority list of needed economic reforms. It is unlikely that rural electrification will be significantly improved without localized production. Encouraging IPPs, including very small energy producers, especially in rural Kenya, should also be a priority.
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